$$CREE = CREE_{UP} - CREE_{GAS}$$

Where:

CREE means the carbon-related exhaust emission value as defined in § 600.002–08, which may be set equal to zero for eligible 2012 through 2016 model year electric vehicles as described in § 86.1866–12(a) of this chapter.

$$CREE_{UP} = 0.7670 \times EC, \text{ and}$$
$$CREE_{GAS} = 0.2485 \times TargetCO_2,$$

Where:

EC = The vehicle energy consumption in watt-hours per mile, determined according to procedures established by the Administrator under § 600.111–08(f).

$TargetCO_2$ = The CO_2 Target Value determined according to § 86.1818–12(c)(2) of this chapter for passenger automobiles and according to § 86.1818–12(c)(3) of this chapter for light trucks.

(2) For 2012 and later model year plug-in hybrid electric vehicles, the carbon-related exhaust emissions in grams per mile is to be calculated using the following equation and rounded to the nearest one gram per mile:

$$CREE = CREE_{CD} + CREE_{CS},$$

Where:

CREE means the carbon-related exhaust emission value as defined in § 600.002–08.

$CREE_{CS}$ = The carbon-related exhaust emissions determined for charge-sustaining operation according to procedures established by the Administrator under § 600.111–08(f); and

$$CREE_{CD} = (ECF \times CREE_{CDEC}) + [(1 - ECF) \times CREE_{CDGAS}]$$

Where:

$CREE_{CD}$ = The carbon-related exhaust emissions determined for charge-depleting operation determined according to the provisions of this section for the applicable fuel and according to procedures established by the Administrator under § 600.111–08(f);

$CREE_{CDEC}$ = The carbon-related exhaust emissions determined for electricity consumption during charge-depleting operation, which shall be determined using the method specified in paragraph (m)(1) of this section and according to procedures established by the Administrator under § 600.111–08(f), and which may be set equal to zero for eligible 2012 through 2016 model year vehicles as described in § 86.1866–12(a) of this chapter;

$CREE_{CDGAS}$ = The carbon-related exhaust emissions determined for charge-depleting operation determined according to the provisions of this section for the applicable fuel and according to procedures established by the Administrator under § 600.111–08(f); and

ECF = Electricity consumption factor as determined by the Administrator under § 600.111–08(f).

(3) For 2012 and later model year fuel cell vehicles, the carbon-related exhaust emissions in grams per mile shall be calculated using the method specified in paragraph (m)(1) of this section, except that $CREE_{UP}$ shall be determined according to procedures established by the Administrator under § 600.111–08(f). As described in § 86.1866–12(a) of this chapter the value of CREE may be set equal to zero for eligible 2012 through 2016 model year fuel cell vehicles.

(n) Equations for fuels other than those specified in paragraphs (h) through (l) of this section may be used with advance EPA approval. Alternate calculation methods for fuel economy and carbon-related exhaust emissions may be used in lieu of the methods described in this section if shown to yield equivalent or superior results and if approved in advance by the Administrator.

[75 FR 25704, May 7, 2010]

§ 600.113–78 Fuel economy calculations.

The calculations of vehicle fuel economy values require the weighted grams/mile values for HC, CO, and CO_2 for the city fuel economy test and the grams/mile values for HC, CO, and CO_2 for the highway fuel economy test. The city and highway fuel economy values must be calculated by the procedures of this section. A sample calculation appears in appendix II to this part.

(a) Calculate the weighted grams/mile values for the city fuel economy test for HC, CO, and CO_2 as specified in § 86.144 of this chapter.

(b)(1) Calculate the mass values for the highway fuel economy test for HC, CO, and CO_2 as specified in paragraph (b) of § 86.144 of this chapter.

(2) Calculate the grams/mile values for the highway test for HC, CO, and CO_2 by dividing the mass values obtained in (b)(1) by the actual distance traveled, measured in miles, as specified in paragraph (h) of § 86.135 of this chapter.

(c) Calculate the city fuel economy and highway fuel economy from grams/mile values for HC, CO, and CO_2. The emission values (obtained per paragraph (a) or (b) as applicable) used in each calculation of this section shall be rounded in accordance with § 86.079–26(a)(6)(ii). The CO_2 values (obtained per paragraph (a) or (b) of this section as applicable) used in each calculation in this section are rounded to the nearest gram/mile.

(d) For gasoline-fueled automobiles, calculate the fuel economy in miles per gallon of gasoline by dividing 2421 by the sum of three terms:

(1) 0.866 multiplied by HC (in grams/miles as obtained in paragraph (c)),

(2) 0.429 multiplied by CO (in grams/miles as obtained in paragraph (c), and

(3) 0.273 multiplied by CO_2 (in grams/mile as obtained in paragraph (c) of this section).

Round to quotient to the nearest 0.1 mile per gallon.

(e) For diesel powered automobiles, calculate the fuel economy in miles per gallon of diesel fuel by dividing 2778 by the sum of three terms:

(1) 0.866 multiplied by HC (in grams/mile as obtained in paragraph (c) of this section),

(2) 0.429 multiplied by CO (in grams/mile as obtained in paragraph (c)), and

(3) 0.273 multiplied by CO_2 (in grams/mile as obtained in paragraph (c)).

Round the quotient to the nearest 0.1 mile per gallon.

[42 FR 45657, Sept. 12, 1977, as amended at 43 FR 52929, Nov. 14, 1978]

§ 600.113–88 Fuel economy calculations.

The Administrator will use the calculation procedure set forth in this paragraph for all official EPA tests. For the 1988 model year, manufacturers may choose to use this procedure or use the calculation procedure described in § 600.113–78. However, once a manufacturer uses this procedure, it must be used for all subsequent tests. This procedure must be used by manufacturers for 1989 and later model years. The calculations of the weighted fuel economy values require input of the weighted grams/mile values for HC, CO and CO_2 for both the city fuel economy test and the highway fuel economy test. Additionally, for tests of gasoline-fueled vehicles, the specific gravity, carbon weight fraction and net heating value of the test fuel must be determined. The city and highway fuel economy values shall be calculated as specified in this section. A sample appears in appendix II to this part.

(a) Calculate the weighted grams/mile values for the city fuel economy test for HC, CO, and CO_2 as specified in § 86.144 of this chapter. For tests of gasoline-fueled vehicles, measure and record the test fuel's properties as specified in paragraph (c) of this section.

(b)(1) Calculate the mass values for the highway fuel economy test for HC, CO, and CO_2 as specified in paragraph (b) of § 86.144 of this chapter. For tests of gasoline-fueled vehicles, measure and record the test fuel's properties as specified in paragraph (c) of this section.

(2) Calculate the grams/mile values for the highway fuel economy test for HC, CO, and CO_2 by dividing the mass values obtained in paragraph (b)(1) of this section, by the actual distance traveled, measured in miles, as specified in paragraph (h) of § 86.135 of this chapter.

(c) Gasoline test fuel properties shall be determined by analysis of a fuel sample taken from the fuel supply. A sample shall be taken after each addition of fresh fuel to the fuel supply. Additionally, the fuel shall be resampled once a month to account for any fuel property changes during storage. Less frequent resampling may be permitted if EPA concludes, on the basis of manufacturer-supplied data, that the properties of test fuel in the manufacturer's storage facility will remain stable for a period longer than one month. The fuel samples shall be analyzed to determine the following fuel properties:

(1) Specific gravity per ASTM D 1298.

(2) Carbon weight fraction per ASTM D 3343.

(3) Net heating value (Btu/lb) per ASTM D 3338.

(d) Calculate the city fuel economy and highway fuel economy from the grams/mile values for HC, CO, CO_2 and, for test of gasoline-fueled vehicles, the test fuel's specific gravity, carbon weight fraction and net heating value.